

CLAIMS

1. A valve device, comprising:

5 a movable valve element (102, 202, 302, 402, 502, 602, 702), said movable valve element further comprising at least one artificial muscle element (101, 201, 301, 401, 501, 601, 701) coupled to the valve element (102, 202, 302, 402, 502, 602, 702).

10 2. The valve device of claim 1, wherein said artificial muscle element (101, 201, 301, 401, 501, 601, 701) is capable of being controlled by an electrical signal.

15 3. The valve device of claim 1 wherein said artificial muscle element (101, 201, 301, 401, 501, 601, 701) is capable of contracting and expanding.

20 4. The valve device of claim 1 wherein said artificial muscle element (101, 201, 301, 401, 501, 601, 701) contains polymer gels as active elements.

25 5. The valve device of claim 1 wherein said artificial muscle element (101, 201, 301, 401, 501, 601, 701) contains carbon nanotubes as active elements.

30 6. The valve device of claim 1 wherein said valve element is a valve tappet (102, 202, 302, 402) of an internal combustion engine and said valve tappet is mounted with displacement movability and said artificial muscle element (101, 201, 301, 401) is coupled directly to said valve tappet.

7. The valve device of claim 1 wherein said valve element is a valve tappet (102, 202, 302, 402) of an internal combustion engine and said valve tappet is
5 mounted with displacement movability and said artificial muscle element (101-401) is coupled indirectly to said valve tappet.

8. The valve device of claim 7, wherein the valve
10 tappet (302, 402) is coupled to a prestressing element (311, 411) which generates a force in one direction of movement of the valve tappet.

9. The valve device of claim 7, wherein the valve
15 tappet (102) is coupled to a gas pressure chamber (111) such that the action of pressure upon the gas pressure chamber causes a movement of the valve tappet.

10. The valve device of claim 7, wherein the
20 walls of the gas pressure chamber (111) are formed completely or partially by the artificial muscle element (101).

11. The valve device of claim 1, wherein the
25 valve element is designed as a pivotally movably mounted flap (502, 602).

12. The valve device of claim 1, wherein the
valve element (702) is comprised of the artificial
30 muscle element (701).

13. A valve device, comprising:

a movable valve element (102, 202, 302, 402, 502, 602, 702), said movable valve element further
5 comprising at least one artificial muscle element (101, 201, 301, 401, 501, 601, 701) coupled to the valve element (102, 202, 302, 402, 502, 602, 702), wherein said artificial muscle element (101, 201, 301, 401, 501, 601, 701) is capable of being controlled by an
10 electrical signal.

14. A method to actuate a valve in an internal combustion engine, comprising:

providing an electrical signal to said valve,
15 said valve having a movable valve element comprising at least one artificial muscle element couple thereto.